

Attorney's Docket No. 9134-32CT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Dhuler

Serial No.: 09/891,700

Filed: June 26, 2001

For: MICROELECTROMECHANICAL DEVICE HAVING SINGLE
CRYSTALLINE COMPONENTS AND METALLIC COMPONENTS

Group Art Unit: 2834

Examiner: D. Le

February 14, 2002

Commissioner for Patents
Washington, DC 20231

AMENDMENT

Sir:

This Amendment is responsive to the Official Action of December 5, 2001. Pursuant to the rules for amendments under 37 C.F.R. §1.121, the specification has been amended herein using the replacement paragraphs and rewritten claims format. The present amendment also includes a section entitled "**VERSION WITH MARKINGS TO SHOW CHANGES MADE**" attached hereto.

In the Specification:

Please replace the abstract of the disclosure with the following.

**MICROELECTROMECHANICAL DEVICE HAVING SINGLE CRYSTALLINE
COMPONENTS AND METALLIC COMPONENTS**

ABSTRACT OF THE DISCLOSURE

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A microelectromechanical (MEMS) device is provided that includes a microelectronic substrate, a microactuator disposed on the substrate and formed of a single crystalline material, and at least one metallic structure disposed on the substrate adjacent the microactuator. While the MEMS device can include various microactuators, one embodiment of the microactuator is a thermally actuated microactuator that may include a pair of spaced apart supports disposed on the substrate and at least one arched beam extending therebetween. Thus, on actuation, the microactuator moves between a first position in which the microactuator is spaced apart from the at least one metallic structure to a second position in which the microactuator operably engages the at least one metallic structure.

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Please replace the paragraph on page 1 following the title with the following.

--RELATED APPLICATIONS

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The present application is a continuation of United States Patent Application Serial No. 09/383,053, filed August 25, 1999 and entitled MICROELECTROMECHANICAL DEVICE HAVING SINGLE CRYSTALLINE COMPONENTS AND METALLIC COMPONENTS, now U.S. Patent No. 6,291,922.--

REMARKS

Applicant provides the present Amendment responsive to the Official Action mailed December 5, 2001. Applicant appreciates the thorough examination as illustrated by the Official Action but respectfully submits that the claims are patentable for the reasons discussed below.

Objections to the Specification

The abstract and reference to related applications have been objected to in the Official Action. Applicant respectfully submits that the objections should be withdrawn as the amendments above fully address the matters raised in the Official Action.

Claims 1 and 35 Are Patentable Over the Cited References

Claims 1, 2, 6-11, 35, 36, 40 and 42-44 are rejected as obvious under 35 U.S.C. § 103 over United States Patent No. 6,137,206 to Hill ("Hill") in view of United States Patent No. 5,335,712 to Petersen et al. ("Petersen"). Applicant submits, however, that independent Claims 1 and 35 are patentable over the cited references as, among other things, the cited references do not disclose or suggest a single crystalline material "microactuator" as recited in each of these claims.

Applicants respectfully disagree with the Official Action's assertion of obviousness as the cited references fail to disclose or suggest all of the recitations of the claims, the alleged obviousness of combining the thermal actuator beams of Petersen with the actuator of Hill is without support, and because the Official Action

fails to provide the clear and particular evidence for combining the references required for a rejection under § 103. To establish a prima facie case of obviousness, the prior art reference or references when combined must teach or suggest *all* the recitations of the claim, and there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. M.P.E.P. § 2143. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. M.P.E.P. § 2143.01, citing *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). To support combining references, evidence of a suggestion, teaching, or motivation to combine must be **clear and particular**, and this requirement for clear and particular evidence is not met by broad and conclusory statements about the teachings of references. *In re Dembiczak*, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). The Court of Appeals for the Federal Circuit has further stated that, to support combining or modifying references, there must be **particular** evidence from the prior art as to the reason the skilled artisan, with no knowledge of the claimed invention, **would have selected these components for combination in the manner claimed**. *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000).

Respectfully, the Official Action fails to meet the requirements for a showing of obviousness under § 103. First, as discussed above, the cited combination of references fails to teach a single crystalline material "microactuator" as recited in Claims 1 and 35. While Petersen does discuss making the flexure and the actuating beams from a single crystal silicon, this is not in the context of a "microactuator." If anything, the beam of Petersen is comparable to the "arched beam" described in the present application and recited in dependent Claim 6, not to the microactuator. (*See, e.g.*, Fig. 1, item 24 as compared with Fig. 1, item 20, which includes item 24). The combination with Hill also fails to address this deficiency as, if anything, Petersen would suggest that the entire structure of Hill be fabricated from a single crystal silicon. This would not result in the claimed single crystalline material microactuator in combination with a "metallic structure" as recited in Claims 1 and 35. Accordingly, the rejections should be withdrawn for at least these reasons.

Furthermore, Petersen is directed to a thermally actuated self test mechanism intended to test "operational capability of flexure area equipped sensors." (Petersen, Abstract). In contrast, Hill is directed to rotary MEMS structures including thermal arched beam actuators. Thus, Hill, like the present invention, is directed to actuator devices, not sensor devices, which are distinctly different applications. The Official Action, while stating it would have been obvious to combine the references for "the purpose of maintaining the same coefficient of expansion," fails to explain what components, if any, of the Hill reference would need the same "coefficient of expansion."

At most, Petersen refers to its beam 38 and flexure area as benefiting from having the same coefficient of expansion. (Petersen, Col. 5, lines 41-54). However, the desirability of such a common structure is because the beam 38 is intended to test the deflection of the flexure area based on a level of deflection as compared with a controlled heat flow provided to the beam 38. Such a motivation simply does not apply to either Hill or the present invention. As described in the present application, the selection of a microactuator from a single crystalline material may be provided to facilitate fabrication, not match coefficients between elements of the microactuator structure. Moreover, at most, one of skill in the art might consider matching of coefficients of thermal expansion as beneficial in the structure disclosed in Hill among ones of the plurality of beams 160 (Fig. 5(a) of Hill), rather than between the beams 160 and the structures connected thereto. Thus, the alleged motivation not only fails to identify what features in Hill should be modified based on Petersen to arrive at the present invention but even fails to provide a motivation to combine the references at all. Accordingly, the rejections of Claims 1 and 35 should be withdrawn for at least these additional grounds.

Various of the Dependent Claims are Separately Patentable

The dependent claims are patentable at least based on their dependence on Claim 1 or Claim 35 as discussed above. Various of the dependent claims are also separately patentable. For example, Claim 6 particularly recites various structures of the microactuator that Petersen further fails to suggest should have the same coefficient of expansion. Claim 44 is also separately patentable based on the

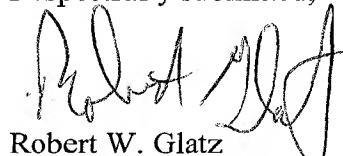
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recitations found therein. In particular, the movement of the microactuator, as recited in Claim 44, between the actuated and unactuated position, is "substantially within the plane of the microactuator and the at least one metallic structure." This is illustrated, for example, in FIG. 2E where the actuator member 26 moves horizontally as drawn in the figure substantially without vertical displacement. In contrast, the thermal actuator beams 38 shown in Petersen have an "axis of expansion ... displaced slightly from the neutral axis of the flexure beam thereby causing deflection of the seismic mass." (Petersen, Col. 5, lines 33-36). Accordingly, Claims 6 and 44 should be allowed for at least these additional reasons.

Conclusion

For the reasons discussed above, Applicant respectfully submits that the present case is in form for allowance. Accordingly, Applicant requests allowance of the pending claims and passing this application to issuance.

Respectfully submitted,

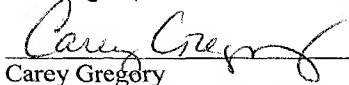


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Carey Gregory

Date of Signature: February 14, 2002